

CLASSIFICATION CONFIDENTIAL  
 SECURITY INFORMATION  
 CENTRAL INTELLIGENCE AGENCY  
 INFORMATION FROM  
 FOREIGN DOCUMENTS OR RADIO BROADCASTS

REPORT

50X1-HUM

CD NO.

COUNTRY USSR

DATE OF  
INFORMATION 1951 - 1952

SUBJECT Economic - Hydroelectric power

DATE DIST. 12 Jun 1952

HOW  
PUBLISHED Daily newspapers; monthly periodicalsWHERE  
PUBLISHED USSR

NO. OF PAGES 3

DATE  
PUBLISHED 25 Dec 1951 - 16 Apr 1952

LANGUAGE Russian

SUPPLEMENT TO  
REPORT NO.

THIS DOCUMENT CONTAINS INFORMATION AFFECTING THE NATIONAL DEFENSE  
 OF THE UNITED STATES WITHIN THE MEANING OF ESPIONAGE ACT 50  
 U. S. C. 31 AND 32, AS AMENDED. ITS TRANSMISSION OR THE REVELATION  
 OF ITS CONTENTS IN ANY MANNER TO AN UNAUTHORIZED PERSON IS PRO-  
 HIBITED BY LAW. REPRODUCTION OF THIS FORM IS PROHIBITED.

THIS IS UNEVALUATED INFORMATION

SOURCE Newspapers and periodicals as indicated.

SCIENTISTS ASSIST IN SOLVING PROBLEMS  
OF HYDRAULIC DEVELOPMENT IN USSR

[Numbers in parentheses refer to appended sources]

The potential water power of the large rivers in the USSR is estimated at 300 million kilowatts (1); 1,500 of these large rivers have enough water power to produce 2,700 billion kilowatt-hours a year. (2) Of the 250 billion cubic meters of water discharged annually by the Volga, only 80 billion cubic meters will be stored in the reservoirs now in existence or under construction. (3) Between 1940 and 1950, the number of GES in the USSR increased, with a total power output 2.5 times greater at the end of the period. In 1950, the GES produced 18.3 percent of the total electric power output of the electric power stations under the Ministry of Electric Power Stations. (1)

The table below compares percentages of utilization of heat and water power for producing electric power in TES, TETs, and GES (3).

	<u>TES</u>	<u>TETs</u>	<u>GES</u>
<u>Losses of Heat</u>		<u>Percent</u>	
In chimney gases	10	10	--
In ashes and cinders	4	4	--
In pipelines and turbogenerators	7	9	9
In condensers	55	--	--
<u>Losses of Water Power</u>			
By evaporation, leaks, and waste	--	--	4
When passing through structures	--	--	2

- 1 -

CLASSIFICATION CONFIDENTIAL

STATE	<input checked="" type="checkbox"/>	NAVY	<input checked="" type="checkbox"/>	NSPB		DISTRIBUTION													
ARMY	<input checked="" type="checkbox"/>	AIR	<input checked="" type="checkbox"/>	FBI															

CONFIDENTIAL

50X1-HUM

	<u>TES</u>	<u>TETs</u>	<u>GES</u>
		<u>Percent</u>	
<u>Useful Output</u>			
Hot water for heating and use in homes and industries	--	40	--
Steam for industries	--	20	--
Electric power	24	17	85
Total	100	100	100

The Academy of the Sciences USSR is constantly concerned with the problems faced by the construction organizations of the great river projects. In November 1951, it sent brigades of scientists and experts to the sites to establish closer contact with the organizations. Each brigade represented different branches of science and was headed by an academician.

The brigade which visited the Volga-Don Canal was headed by E. A. Chudakov. Among various problems undertaken by the visiting scientists was the method of placing concrete in freezing temperatures by using calcium chloride or heating the concrete electrically.

S. A. Khristianovich headed a brigade which visited the site of the Kuybyshev GES construction.

The Stalingrad GES construction site was visited by a brigade under V. C. Kulbakin.

A mixed brigade consisting of representatives of the Academies of Sciences USSR and the Ukrainian SSR under the direction of A. V. Palladin visited Zaporozh'ye, Kakhovka, and other points on the sites of the Kakhovka GES and the South Ukrainian and North Crimean Canals. An outcome of the brigades' visits was the addition of 50 new items to the previously prepared list of problems the Academy of Sciences USSR must solve for the builders. The presidium of the academy has decided to keep the brigades permanently. (4)

A brigade was also organized for the Main Turkmen Canal construction and it visited the site in April 1952. (5)

The scientific research institutes of the technical department of the Academy of Sciences USSR are working on a number of important investigations for the great projects.

V. V. Sokolovskiy, corresponding member of the Academy of Sciences USSR, worked out a new and exact method of designing foundations and other parts of hydraulic engineering structures. This method has resulted in economical and safe designs for hydraulic centers and canals.

V. A. Florin, Doctor of Technical Sciences, proposed a very economical method for solidly packing the loose, water-saturated sands, which are so often encountered in the Volga River bed, by means of explosions. Tests performed at the Kuybyshev GES construction site have proved the effectiveness of the method.

V. Z. Vlasov, Doctor of Technical Sciences, author of an original theory for calculating the strength of structures, has worked out new light-type structures for hydraulic projects. The new designs save up to 30 percent in materials.

- 2 -

CONFIDENTIAL

CONFIDENTIAL

50X1-HUM

N. I. Prigorovskiy, Doctor of Technical Sciences, discovered a method for working out important and complicated details of hydroturbines at static loads.(6)

In a flat country like the USSR, the amount of water flowing in rivers varies from season to season. The full utilization of water power for producing electric power and other purposes all year round requires large reservoirs where water can be stored during the spring floods and used the rest of the year. Usually the water head at the dam of such a reservoir is 20-30 meters, seldom reaching 60 meters. To obtain a large amount of power from such an insignificant head is a complicated engineering problem. The structures of the GES built to withstand the water pressure are the concrete spillway, the earthen dam, the navigable locks, the passages and the elevators for fish, and the structure housing the power plant. The combined length of these structures is usually 4-6 kilometers or, rarely, 10-20 kilometers. Since the rock formation usually lies hundreds of meters below the river bottom, the excavation of huge layer of soft ground is very expensive and is therefore not feasible. At present, the possibility of building the structures of a GES on soft ground has not only been proved theoretically, but also practically. Soviet scientists and engineers are responsible for solving this important problem.

Hydroturbines with adjustable blades are used to take care of the varying water pressure. The maximum diameter of such turbines is 9-9.3 meters. An aggregate equipped with such a turbine develops 100,000-120,000 kilowatts.(1) The turbines are manufactured in the USSR and their efficiency is 90-92 percent; the efficiency of the Soviet-manufactured generators is 96-97 percent.(7)

The number of bearings in a Soviet-made hydraulic turbogenerator is reduced to two, one for the generator and another for the turbine. The thrust bearing with self-adjusting segments made in the USSR is much better than the one manufactured abroad.

The modern GES aggregate is controlled automatically. The aggregate is connected with a common network by the self-synchronization method which was developed theoretically and experimentally in the USSR.(1)

#### SOURCES

1. Moscow, Elektrichestvo, No 1, Jan 52
2. Kishinev, Sovetskaya Moldaviya, 6 Jan 52
3. Moscow, Znaniye Sila, No 3, Mar 52
4. Moscow, Izvestiya, 25 Dec 51
5. Yerevan', Kommunist, 16 Apr 52
6. Vechernyaya Moskva, 12 Feb 52
7. Moscow, Nauka i Zhizn', No 2, Feb 52

- E N D -

- 3 -

CONFIDENTIAL